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## **Hyperlink desirability in adolescent fiction: location and absorption**

### **Abstract**

In the digital age, children's and adolescents' willingness to engage in absorbed reading for pleasure is on the decline. Digital narratives with a linear storyline enriched with hyperlinks to supporting media materials, could potentially facilitate narrative absorption even better than print, thus stimulating fictional reading among adolescents. This paper examines hyperlink placement desirability in five full-length novels, and investigates the link with narrative absorption. It was found that, independently of genre, the desired hyperlinks were most concentrated in the first quartile of the story, and gradually diminished towards quartile four. Furthermore, closer scrutiny of one case study showed that as reported narrative absorption levels increased, hyperlink desirability decreased. The results suggest that hyperlinks to different types of supporting media materials could be particularly useful to assist reading if situated in the first quartile of digital narrative. As the story plot reaches its climax, hyperlinks may become less required for experienced readers, whereas lower ability readers might still benefit from their support to sustain the reading experience.

### **INTRODUCTION**

Shaping pupils' reading habits is an important aspect of teaching fiction in school (Wintersparv et al., 2019), and their development is often discussed in relation to reading comprehension and academic achievement (OECD, 2010). The inclusion of reading routines in children's and adolescents' leisure-time activities considerably contributes to the development of reading proficiency and academic success, especially for low-ability readers (Mol, 2010). Particularly time spent on fictional reading is associated with higher PISA

reading scores (Jerrim & Moss, 2019) and improved reading comprehension (Torppa et al., 2019). As a recent drop in reading performance (OECD, 2016) coincides with growing digitization and more access to short, online texts, the interest of scientific and educational communities continues to grow with regard to reading in the digital age. On the one hand, children's and adolescents' reading habits have become the object of scientific and social concern (Carr, 2010; Baron, 2015), as the shift from long-form to short-form texts is linked to a change in reading modes: an increase in skimming short, online texts, and a decrease in absorbed and/or deep reading of longer printed texts (Kovac & van der Weel, 2018).

Particularly children's willingness to read for pleasure seems to decline throughout primary and secondary education (Hornstra et al., 2013; McKenna et al., 2012), which shows in diminishing numbers of book readers – most notably among adolescents (Twenge et al., 2018), and in reduced book reading time (Wennekers et al., 2018). However, the digital evolution has equally evoked optimism as digital reading technologies might also support reading among specific groups of evolving readers, such as boys, reluctant readers or children from low-literate families (Picton, 2014; Tveist & Mangen, 2014). Notably for adolescents, audiovisual and interactive narratives tend to be more attractive than traditional reading for leisure (Chin Ee & Baoqi, 2018; Clark & Teravainen, 2017). Moreover, with regard to digital narratives, previous research has shown that particularly enhanced e-books that include sound or dynamic visual images could facilitate absorbed reading experiences even better than traditional print (Schlochtermeyer et al., 2015). In the light of increasing digitization, literary reading on screen is likely a long-term phenomenon (Schwabe et al., 2021), yet so far, the impact of digitization on the experience of narrative texts has been debated mostly on a theoretical level, and scholars underline the need for more interdisciplinary empirical research on the literary reading experience (Mangen, 2016; Thomson et al., 2018). Overall empirical research on reader experiences of digital fiction is scarce (Bell et al., 2018), and despite their

potential to make reading more appealing, the particular effects of enhanced e-books on absorbing reading experiences of evolving readers have not yet been empirically measured in earlier studies. To address this research gap, the current study was designed to examine readers' desired placement of multimedia hyperlinks in narrative texts, and investigate the link between desired hyperlink placement and reader absorption in the storyworld.

## **BACKGROUND**

*Deep reading* is defined by Wolf and Barzillai (2009) as “the array of sophisticated processes that propel comprehension and that include inferential and deductive reasoning, analogical skills, critical analysis, reflection, and insight. The expert reader needs milliseconds to execute these processes; the young brain needs years to develop them” (p. 32). In addition to reading on paper, reading on digital screens such as computers, e-readers, tablets and smartphones has become increasingly common in both educational and recreational reading (Hyman et al., 2014; Barzillai & Thomson, 2018). However, due to the omnipresence of short, digital texts online, a growing number of children and adolescents is said to read fewer long-form informational and narrative texts, be less motivated to do so, and consequently underperform, as they simply do not become involved often enough with longer-form text types to evolve into expert readers that engage in deep reading. “Digital media are increasing the volume and tempo of visual stimuli”, which gives the deep-reading circuit “less time to process and perceive, [which] means less time to connect the incoming information to one’s background knowledge and thus less likelihood that the rest of the deep-reading processes will be deployed” (Wolf, 2018, p. 122). In other words, even digital reading habits as such might hamper in-depth text processing, which is essential to develop the deep reading skills necessary for *expert* readers that engage in, analyse, and reflect on text types such as

“academic reading, literary fiction, poetry, serious journalism and non-fiction” (Kovac & van der Weel, 2018).

To that end, in the *developing* reading brains of children and adolescents, Wolf, Ullman-Shade and Gottwald (2016: 150) distinguish three critical deep reading processes that should be fostered: “a. their ability to draw analogies using a well-developed repertoire of background knowledge; b. critical analysis and the capacity to evaluate the truth and value of what is read; and c. empathy and the ability to take on the perspective of others”. While the first two processes can be trained by reading informational as well as narrative texts, the development of the latter, empathy and perspective-taking, can particularly be fostered by *absorbed reading* experiences of narrative texts. A number of studies on narrative absorption, which investigate the emotional dimension of narrative texts, have demonstrated associations between reading narrative fiction and readers’ levels of empathy (e.g., Mar & Oatley, 2008; Johnson, 2012), and between absorbed reading experiences and affective responses to characters in the story world (Kidd & Castano, 2013).

*Narrative absorption* (Tellegen & Atkinson, 1974), also called *narrative engagement* (Busselle & Bilandzic, 2009), *immersion* (Ryan, 2001; Jacobs, 2015), or *presence* (Lee, 2004), is the feeling of being absorbed by or *transported* into a narrative world, “blissfully unaware of your surroundings and daily worries” (Ryan, 2001). It involves sustained attention to and open reflection on the story world (Kuiken & Douglas, 2017), and differs in that sense from similar concepts such as *optimal experience* or *flow* (Csikszentmihalyi, 1992), as it entails empathy and vivid visual imagery of the story world (Green & Brock, 2000). Narrative absorption may vary depending on modality, and the feeling of getting “lost” in a book (Nell, 1988) has the highest reported absorption potential in that regard, when compared to film and music (Hakemulder, 2013). Storyteller variables (i.e. identifiable characters; imaginable plot; verisimilitude) and story-receiver variables (i.e. familiarity; attention; transportability; age;

education; gender) significantly influence absorption, as identified in the meta-study by Van Laer et al. (2014); independent of those factors, absorption in written narratives may also vary according to the preferred reading medium (print or digital text). Readers' preferences for print or digital narrative are influenced by their attitudes and prior experience with digital reading environments (Kaakinen et al., 2018), as well as their motivational orientation (Larson, 2015). The former are at their turn influenced by age and gender: in secondary school, digital texts are preferred, while primary school children prefer print (McGeown et al., 2016), and boys are more likely to prefer e-readers than girls, with the exception of devoted readers, who tend to prefer print to e-readers (Tveist & Mangen, 2014). Digital and print reading, however, also differ in terms of reading technology. Depending on the technology (paper, computer screens, tablets, e-readers, smartphones, virtual reality goggles) different reading experiences are possible (e.g., Benedetto et al., 2013).

Yet more importantly, digital reading also allows for a broader spectrum of text types than print, namely a variety of non-linear, often multi-modal, texts that may contain hyperlinks and different types of digital enhancement. These text types are often expository texts read online, and it is important to note that such texts equally require advanced digital reading competencies that must be explicitly taught (Salmerón et al., 2018), such as focused searching and navigating in hypertext and multimedia sources, integrating multiple sources of information, and critically evaluating the quality of claims made (Afflerbach & Cho, 2010). In this article we are concerned with digital narratives, which may also be structured as non-linear hypertext, in which readers can navigate to other materials. The first non-linear digital novels, called *hyperfiction*, were exclusively composed of written words (Landow, 1997), and allowed for different degrees of reader participation (Gutiérrez, 2014): from constructive hyperfiction (readers partly became authors as they constructed the story) to exploratory

hyperfiction (readers could browse through different pathways the author had previously created).

Modern day non-linear digital narrative contains, apart from written words, hyperlinks to multimedia - such as sound and dynamic visualisations – and is called *hypermedia fiction*. Exploratory hypermedia fiction allows the reader to browse through the story and consult different types of supporting or enriching media materials by clicking or tapping on hyperlinks (Tillman, 1997; Simons, T'Sas & Mommaerts, 2014). It is equally important to note that the surge of new digital formats for eBooks, and the use of apps on portable devices, also enables hybrid forms such as *narrative apps*, “print narratives remediated to interactive digital formats that range in degree of interactivity, and are navigated via hyperlinks and/or interactive games as well as other multimodal features,” and *enhanced narrative apps* with “additional paratextual materials” (Allan, 2017), which can display the same features as so called *born digital narratives*, “conceived of, and created for, a digital environment” (Allan, 2017), such as hypermedia fiction.

Reading and digitisation is a multi-faceted area of research, and most studies that have explored the differences between linear and non-linear or multimodal texts have focused on informational texts in online settings (e.g., Salmerón & García, 2012). So far, most research on differences in reading experiences has been confined to the cognitive aspects, and focused on reading comprehension (for reviews, see Clinton, 2019; Delgado et al., 2018; Kong et al., 2018), rather than on the emotional and motivational aspects typically related to narrative reading.

In terms of absorption, it is important to note that particularly for digital narrative texts, the reading technology (computer, tablet, e-reader, smartphone, VR-goggles) may change the perceptual and haptic experience of reading, which again may influence narrative absorption (Mangen, 2008). For non-linear digital narrative in particular, too elevated degrees of reader

participation (and thus high levels of non-linearity), could hamper proper text processing, and thus hinder absorbed reading experiences. Previous empirical reader-response studies are scarce, yet indicate that certain types of non-linear digital narrative, such as constructive hyperfiction, may not support narrative absorption (Miall, 2004) or lead to narrative absorption distinct from that in printed text (Douglas & Hargadon, 2001). On the other end of the spectrum, however, exploratory hypermedia fiction with a linear storyline or enhanced narrative apps, enriched with supporting or enriching media materials, could have an absorption potential even beyond that of traditional print (Schlochtermeyer et al., 2015).

Despite the extensive research on narrative absorption in novels, movies, or video games over the last two decades (e.g., Bezdek & Gerrig, 2017; Busselle & Bilandzic, 2008; Tal-Or & Cohen, 2010), in which the origin and effects of absorption experiences have been described, Thomson et al. (2018) underline the need for more developmental research on how narrative absorption in written narratives may vary as a function of reading technology and non-linearity: “[with regard to] hyperlinked text requiring frequent within-text decisions as to what content to read next, an open question for the field is the degree to which digital text can support ‘immersive’ reading experiences that have traditionally been experienced when reading print-based literary texts.” Indeed, research to date has not yet empirically determined whether the theoretical assumptions (Mangen, 2008; Mangen & van der Weel, 2017), and the findings from scarce empirical studies (Miall, 2004; Miall & Dobson, 2001) on absorption in early hypertext fiction read on computer screens hold true for modern day multimodal non-linear narrative, which can be read on portable reading devices, while the differences between digital reading and reading on paper continue to diminish (Clowes, 2019). The empirical study by Mangen and Kuiken (2014), in which absorbed reading experiences of the same (linear) texts in print and on iPad were empirically compared for the first time, seems to confirm the latter. The same text was labelled as fiction and non-fiction and read in print or on



iPad, thus creating four different conditions. When presented as ‘fiction’, no clear differences between digital and print reading emerged in terms of absorption. In a recent empirical study by Schwabe et al. (2021) no differences were detected between the subjective emotional nor cognitive reading experiences of 207 respondents of the same narrative text on an e-reader and in a printed book, despite the inclusion of a broad variety of dimensions of the literary experience in the analyses.

Besides the materiality of the technology, the precise role of hyperlinks in reading experiences of digital narrative equally remains unclear. Cognitive load may increase as readers of hypertexts have to decide whether or not to click on hyperlinks (DeStefano and LeFevre, 2007), which might hamper absorbing reading experiences. Then again, well-chosen hyperlinks could remediate a lack of conceptual knowledge in the reader and prove beneficial (Clowes, 2019). In subsequent empirical reader-response studies on recent hypertext and hypermedia fiction, Pope (2010; 2020) investigated to what extent non-linear digital narrative has overcome acknowledged problems from earlier hyper-narratives in order to facilitate absorbing reading experiences. The results showed that a harmonious balance between “a very accessible interface, smooth integration of hyperlinks and interactive elements, and meaningful utilization of multimedia components” (Pope, 2020) was essential for narrative absorption. More specifically, more linear story structures with limited numbers of hyperlinks, interactive elements applied in function of the story, and narrative closure improved readers’ overall grasp of plot and story, and facilitated narrative absorption. A meta-reflective study on hyperlink desirability by Vanhees et al. (2020) showed that both hyperlink type and frequency desirability were influenced by the literary genre of narrative texts.

However, to our knowledge, no other detailed investigation of the desirability of hyperlinks in narrative texts in terms of type, frequency, and placement has been carried out. Moreover, none of the studies mentioned above has included full-length novels or focused on

children and adolescent readers, whose evolving reading brains and habits are likely to be most affected by differences in reading modes on distinct reading technologies. It is therefore of interest not only to compare the impact of different portable reading technologies on the absorbed reading experience of full-length novels, but also to shed light on differences between linear and non-linear narrative texts of various literary genres, and the potential impact of multimedia hyperlinks on the absorption processes of evolving readers.

## **AIM AND RESEARCH QUESTIONS**

This paper reports on an experimental study that set out to investigate the desired *placement* of multimedia hyperlinks in novels of five literary genres, and shed more light on the relationship between hyperlink placement and *narrative absorption*, based on the following research questions:

RQ1: Where in the novel do adolescent readers and their language teachers mark hypothetical hyperlinks to support and/or enrich the reading experience?

RQ2: What is the relationship between the placement of desired hyperlinks in a literary text and narrative absorption?

## **RESEARCH DESIGN**

In this section the following elements are discussed for each research question separately: first the participants, then the research instruments, and finally the general procedure for data collection and analysis.

### ***Participants***

In order to answer **RQ1**, the initial goal was to include 30 pupils (6 per novel) and 30 teachers (6 per novel). Therefore a study proposal was submitted to the principals of 100 schools in Flanders (the Dutch-speaking part of Belgium). A convenience sample was compiled, which was subsequently expanded through snowballing. Parental permissions for their pupils' participation were obtained before data collection. All respondents gave informed consent and were anonymised. Thanks to the high response rate, the sample was expanded to **102 pupils** and **44 teachers** of 37 secondary schools. The 102 seventh- (60%) and eighth-grade (40%) pupils (i.e. 12-14 years old), of whom 41% were boys and 59% girls, attended general secondary education (A-stream) in seven schools. All schools served pupils of varying income levels and ethnic groups. With regard to the 44 teachers, 7 were male (15.9%) and 37 were female (84.1%), their average age was 39.2 years (SD = 8.8), and their average teaching experience 13.1 years (SD = 8.5), ranging from 1 to 31 years.

**RQ2** builds on and deepens the findings of RQ1. Therefore an additional independent sample of **107 pupils** attending general secondary education was included. These participants were recruited from 5 classes of a large secondary school where one novel had been adopted in the reading programme for the 7<sup>th</sup> grade. As a result, the second sample comprised 107 pupils, (45% boys and 55% girls).

### ***Research Instruments***

Data were gathered using three different research instruments: novels, focus group discussions, and a survey. The novels were the main data source, the focus groups provided a more detailed and deeper understanding of the quantitative data, and the survey provided a more detailed understanding of how the participants experienced narrative absorption in one case study.

## *Novels*

Five novels were used as study material for RQ1. They were published in the respondents' L1, Dutch, the language in which pupils at this level are expected to read most. The selection was carried out on the basis of the following criteria: acceptable length (under 250 pages); sufficient possibilities to add hyperlinks; level of difficulty that matches the target audience (based on reading lists of reading organisation *Iedereen Leest* (Everybody Reads) with age-appropriate titles); and diversity of topics and genres, resulting in the following list:

(a) *De hond van Roosevelt* (Roosevelt's dog) by Aline Sax, a historical novel (65p.); (b) *Skellig* by David Almond, a fantasy novel (150p.); (c) *Veldslag om een hart* (Battle for a Heart) by Michael De Cock, an adaptation of a classic story (126p.); (d) *#Selfie* by Caja Cazemier, a problem novel (176p.); (e) *Zwarte zwaan* (Black Swan) by Gideon Samson, literary realism (207p.). The complete novels were used in their original publication format rather than a (partial) reproduction. First the publisher's and author's permissions were obtained, and subsequently the participants were invited to rank the titles they wanted to read on the basis of the five blurbs. A balance was aimed for between respondent preferences for specific novels and an equal representation of all novels in the study, which implied 90% of the respondents were assigned their first choice, and 10% were given their second choice. None of the respondents were assigned their third choice.

The following table gives an overview of the five novel genres and the distribution of the participants of RQ1 (pupils and teachers).

*Table 1. Caption here*

Table 1 shows that the initially perceived balance in the number of respondents per novel was not completely obtained if completion of the reading task is taken into consideration. *De*

*hond van Roosevelt* had the largest (n = 38), and *Zwarte zwaan* had the smallest reading audience (n = 22). However, each novel was read by both respondent groups, and, despite the underrepresentation of male teachers, mostly also by both genders. Moreover, the novels were well distributed over grades 7 and 8.

The respondents were invited to mark, if desirable, two types of hypothetical hyperlinks. These were defined as follows:

*Type 1: Explanatory hyperlinks supporting information for pupils, to increase comprehension*

Explanatory hyperlinks refer to glosses, historical or cultural information, etc. Pupils might observe “I don’t understand this” or “I don’t know this” regarding these words or phrases and want to know more about them to increase their comprehension. Examples:

- “SS insignia” (*De hond van Roosevelt*, p.27; P093)
- “to blackmail” (*#Selfie*, p.165; P088)
- “Pippi Longstocking” (*Zwarte zwaan*, p.17; T053)

*Type 2: Enriching hyperlinks to signal particular elements or beautiful passages*

Enriching hyperlinks refer to stylistic or literary information, such as original metaphors, citations, references to other stories, paratextual information, etc. Pupils might observe “This is beautiful or special. I would like to know more” regarding these words or phrases.

Examples:

- “How can the bird that is born for joy sit in a cage and sing?” (*Skellig*, p.48;T061)
- “and those words burned holes in my head and in my heart” (*Veldslag om een hart*, p.22;P100)

In order to answer RQ2, i.e. the relationship between the placement of hyperlinks in a literary text and narrative absorption, operationalized as perceived suspense, one novel was selected based on the results of RQ1, and subsequently read by the second participant sample.

They were given no specific instructions for the reading task, only to answer a short questionnaire upon completion of the novel.

### *Focus Group Discussions*

Subsequently, focus group discussions were organized with a limited selection of participants to provide a more detailed and deeper understanding of the quantitative data. They were considered an additional supplementary data source (Morgan, 1998), besides the main data set, the annotated novels. Three focus groups (one with 8 pupils – 6 girls, 2 boys; two with 3 teachers each – 6 women, 0 men) were organized to investigate how both respondent groups experienced adding their desire for hyperlinks across the distinct novels, and whether differences arose between the hyperlinks each group considered useful and necessary. Focus group discussions ideally have four to ten participants (Liamputtong, 2011), but due to availability reasons two teacher focus groups were organized with three participants each, rather than one with six participants.

### *Survey*

For RQ2, a short online questionnaire was designed to ascertain how the participants perceived absorption in the story world, which was compiled in Dutch. The members of the research team (i.e. the authors and three pre-service language teachers) each read the novel independently, and selected the five passages (A to E) in the story they considered most compelling and suspenseful. A subsequent group discussion of the plot and comparison of the individual results revealed complete agreement on the five most absorbing passages, only differing in the level of suspense attributed to each passage. On completion of the novel, the participants were asked to rank these five passages on a five-point Likert scale on the basis of perceived absorption. To rule out the possibility that two or more fragments would receive the

same score, the participants were told to assign each score only once, and thus to analyse the absorption level and order the fragments accordingly from 1 (least) to 5 (most compelling and suspenseful).

### ***Data Collection***

All data for RQ1 were collected between February and May 2018. All respondents were first informed about the aim and the hyperlink types detailed above, then annotated one page to practice and received feedback from the researchers. The pupil data were collected in schools and intact classes were informed by the researchers during their regularly scheduled 50-minute language class. The teachers were informed during a similar individual or group session with the researchers, typically during a spare hour in their timetables.

Afterwards, the respondents had three months to read their novel, and mark the instances for which they would like to have hyperlinks. They were instructed to circle explanatory, and underline enriching hyperlinks. The annotated paper copies were then analysed in terms of hyperlink placement (for the average hyperlink scores see Table 2). Next, three focus groups (one with pupils; two with teachers) were organized to deepen the insights with qualitative data.

All data for RQ2 were collected between December 2019 and March 2020. The pupil data were collected in schools and intact classes were instructed to read the novel, and probed upon completion during the next scheduled language class. The surveys were administered online and completed in class in the presence of their language teacher.

### ***Data Analysis***

For RQ1, the annotated novels were analysed in an Excel-file where all hyperlinks were marked in terms of number and content. In the raw data, all hyperlinks were marked exactly

as they had been annotated. Subsequently, the data was analysed to verify if respondents had not misinterpreted any explanatory hyperlinks as enriching or vice versa. Only in very obvious cases (e.g. P052 had underlined both types), they were recoded into two types. In case of potential misinterpretation (e.g. explanatory links that might also be interpreted as enriching) the data was left untouched and processed exactly as marked by the respondents. Further data management and analysis was performed using SPSS software (version 25). Quartiles were used to gain a more detailed understanding of the respondents' placement of hyperlinks across the novels. We acknowledge that readers might expect a distinct operationalization of hyperlink location, as the use of quartiles may at first seem at odds with research on non-linear reading. However, as in this exploratory stimulation study linear novels were read on paper during the experiment, it offered an effective way of mapping the desirability and location of hypothetical supporting and/or enriching hyperlinks, with a view to exploring both their potential to provide reader support or deepen the reading experience, and the degree to which readers would consider non-linearity desirable in those novels. In subsequent studies that measure the actual *effects* of hyperlink location (and content) on reader experiences in digital multimodal narratives with fully operable hyperlinks, such as enhanced narrative apps, however, such an operationalization of hyperlink location would not be appropriate.

Next, the three focus group discussions were analysed. They were video-taped and transcribed verbatim. During the first coding phase, one researcher conducted an explorative analysis of the transcripts in which the research questions constituted the framework of the initial coding scheme. Data-driven analysis refined and extended the coding scheme and the re-coded data were then analysed with NVivo12 software. The validity structure (Johnson, 1997) of the qualitative data analysis was ensured through investigator triangulation and peer review: two researchers monitored the data collection and each performed an independent



coding of the data (inter-rater reliability). Inconsistencies in coding between both researchers were then discussed. Additionally, low inference descriptors were used: the respondents' actual language was reported with direct quotations (see Results section).

For RQ2, the online survey was converted to digital format with *Evasys*-software, and analysed using SPSS software (version 25). Subsequently, the case study and survey data files were merged to match pupils' perceived absorption with the hyperlink placement data from RQ1.

## **RESULTS**

The results of this empirical study on the placement of desired hyperlinks in adolescent fiction are presented below in two separate sections that correspond to the underlying research questions. In what follows, we first compare desired hyperlink placement across five distinct novels, and subsequently further investigate the relationship between hyperlink placement and narrative absorption in a case study of one specific title.

### **RQ1: Where in the novel do adolescent readers and their language teachers mark hypothetical hyperlinks to support and/or enrich the reading experience?**

The first aim of the present research was to examine at what place in the story adolescent readers and their teachers would mark hyperlinks they considered desirable in one of the five novels included in the study. To that end, the annotated novels were analysed in terms of the number of hyperlinks marked by the average respondent of each novel, as shown below.

*Table 2. Caption here*

Table 2 compares the average hyperlink scores per page for each title, while considering the annotated length of the novels. It is apparent from this table that *De hond van Roosevelt*, a historical novel, has the highest average hyperlink score per page of all titles, which is approximately four times that of *Zwarte zwaan* (literary realism) and *#Selfie*, a problem novel, at the other end of the spectrum. *Veldslag om een hart* (adaptation) and *Skellig*, a fantasy novel, are situated in between both extremes and have relatively similar average hyperlink scores per page. However, in order to comprehend how the desired hyperlinks are distributed across the novels, it is essential to visualize the number of hyperlinks the average respondent marked per page in the distinct titles (Figures 1-5; page numbers on the X-axis), and consequently verify where those desired hyperlinks are placed in the story. In what follows, we subsequently visualize the average number of hyperlinks marked per page for each title, and link the findings to the average hyperlink scores per quartile, as described in Table 2.

#### **A. *De hond van Roosevelt* (historical novel)**

Figure 1 visualizes the number of desired hyperlinks per page in *De hond van Roosevelt*, a historical novel. It shows a steady decline in the average hyperlink scores after the first ten pages, which then drops to an absolute low point on page 23. The number of hyperlinks reaches a distinct peak of more than five hyperlinks per page on average on page 38, and subsequently drops sharply, only to continue decreasing towards the end of the story. The steep increase observed at the peak of the chart could be attributed to the elevated number of unknown concepts and terminology on the respective page, which led to a subsequent concentration of desired hyperlinks. Interestingly, Table 2 shows that the largest proportion of the average hyperlink score per page (0.87; Table 2) is situated in the first quartile of the chart

(1.26), and then slowly but steadily declines towards the fourth quartile, where less than 50% of the initial number of hyperlinks was marked (0.56).

*Figure 1. Caption here*

### **B. *Veldslag om een hart* (adaptation)**

Figure 2 gives an overview of the average number of desired hyperlinks in *Veldslag om een hart*, an adaptation of a classic story. It illustrates a steady decline in the number of hyperlinks as the story unfolds. The average scores already reach a peak three times in the first quartile of the curve, which is reflected in its elevated average score (0.96), as shown in Table 2, and then slowly but steadily decrease through quartile two (0.62) and three (0.55), only to reach their lowest point in the fourth quartile (0.47) at the end of the novel. This result may be explained by the fact that many historical and cultural characters, objects and habits are introduced in the first quartile of the story, and repeated later on, but possibly no longer marked by the respondents as a desired hyperlink. Interestingly, the number of hyperlinks also fluctuates heavily, as the curve reaches many recurrent low points, where no desired hyperlinks were marked.

*Figure 2. Caption here*

### **C. *Skellig* (fantasy novel)**

The following figure shows the average desired hyperlinks per page in *Skellig*, a fantasy novel. What stands out in Figure 3 is the number of low points and peaks in the curve, similar to that of *Veldslag om een hart*, as described above. The peak in the average number of desired hyperlinks is situated almost in the middle of the story, which divides the chart in

relatively higher hyperlink scores on the left hand side, and lower scores on the right hand side. The data in Table 2 confirm that the average hyperlink scores in the first quartile (0.74) drop sharply in the second (0.46), and continue to decline, though not drastically, in the third (0.45) and fourth (0.42) quartiles. The average hyperlink rate per page across the novel is 0.52 (Table 2), more than twice as elevated as the rates of the realism and problem novels, and relatively similar to that of the adaptation novel, but well below the average of the historical novel.

*Figure 3. Caption here*

#### **D. *Zwarte Zwaan* (literary realism)**

As shown in Figure 4, the curve of the literary realism novel *Zwarte Zwaan* is quite quirky, with numerous peaks and low points, and generally low (0.24; Table 2) yet fluctuating average hyperlink scores per page, similar to *#Selfie*, and as such far below the other titles. The highest concentration of hyperlinks as well as the peak in the curve, however, can once again be situated at the start of the novel. The hyperlink data in Table 2 for the first quartile (0.36), as opposed to the fourth (0.15), clearly support this view. In contrast, the average number of hyperlinks per page surprisingly increases slightly from the second (0.20) to the third (0.24) quartile, contrary to the general trend observed in the other novels.

*Figure 4. Caption here*

#### **E. *#Selfie* (problem novel)**

As shown in Table 2, *#Selfie*, a problem novel, has the lowest average hyperlink scores per page of all novels (0.21), only similar to *Zwarte zwaan* and far below the average scores in the

other titles. As the peak is situated at the very beginning of the novel, the curve in Figure 5 shows a steady decline in the average number of hyperlinks per page as the story unfolds from the first to the fourth quartile (0.31; 0.15 - see Table 2), in a descending trend similar to that of the adaptation novel (Figure 3). Similar to the hyperlink curves of the other titles – with the exception of the historical novel – the number of hyperlinks fluctuates heavily, and the curve exhibits numerous low points, in which (almost) no hyperlinks were marked.

*Figure 5. Caption here*

As we itemized the results into each hyperlink type separately, it became clear that, independently of genre, the explanatory hyperlinks showed a clear tendency to fluctuate, whereas the enriching hyperlinks remained rather constant across the novel, often after more elevated scores in the first quartile of the story. Figure 6 exemplifies these general findings for the novel *De hond van Roosevelt*.

*Figure 6. Caption here*

Overall, these results indicate that, independently of literary genre, the average desired hyperlink scores per page diminish by half in the first as opposed to the fourth quartiles of each title. The highest concentration of hyperlinks is situated in the first quartile of the story in all novels, and decreases as the story unfolds, through quartiles two and three, towards the end of the book. Only the realism novel seems to be somewhat exceptional, as it exhibits a small increase in hyperlinks between quartiles two and three, which may be due to its nonlinear narrative in which events are portrayed out of chronological order, and the frequent changes in narrative perspective.

The elevated number of desired hyperlinks in the first quartile of all novels may be explained by a combination of elements. A partial explanation might be that respondents initiate the annotation task with great enthusiasm (novelty effect), which diminishes as their reading continues, and may even decrease as the novel length increases. Many unknown words, concepts, and - especially in case of the historical novel and adaptation - historical figures and terms, are also first introduced in the story in the first quartile, and as such might be repeated later on, but no longer marked. As T52 said in the focus group discussions: *“If I had already marked a word or phrase once, I didn’t repeat it (the annotation) later on in the novel, at least not consciously.”* P051 confirmed this: *“I marked more in the beginning, mostly because in my novel (the adaptation) the same words would return later on, so I didn’t have to mark them again.”* The latter observation could equally hold true during the reading process of hypermedia fiction; once a hyperlink to, for instance, a word explanation, has been consulted the concept or term might be remembered during the complete reading session.

Another possible explanation, however, might reside in the suspense structure of the story itself, and the consequent narrative absorption of the reader. As the story unfolds, and suspense increases, the reader becomes more and more absorbed in the story world and requires less and less hyperlinks. As P049 put it: *“Sometimes I was so absorbed by the story that I simply forgot to mark (hyperlinks).”* P052 added: *“Sometimes you were in the middle of a sequence... you wanted to mark something, but at the same time go on with the story. Then it (the annotation task) became distracting (from the story).”* The low points in the curve, where (almost) no hyperlinks are desired, might then be related to suspenseful parts of the story, where narrative absorption is high, and all of the reader’s attention is focused on the visualisation of the story, rather than on unknown concepts or beautiful phrases to be marked.

In that regard, the low average hyperlink scores across the problem novel *#Selfie* as opposed to other genres (Table 2), and its decreasing hyperlink curve with frequent low points (Figure 5) might not only be due to the accessible style of writing in this particular novel, with a relatively limited number of unknown words and concepts, but also to the suspenseful nature of the literary genre itself. Genre fiction, such as problem novels, is typically associated with more elevated levels of narrative absorption (Kovac & van der Weel, 2018), and might therefore require less hyperlinks than other genres. Moreover, the storyteller variables (i.e. identifiable characters; imaginable plot; verisimilitude) that significantly influence absorption, as identified by Van Laer et al. (2014), clearly apply to this particular novel as well, with adolescent main characters of the same age as the respondents, and a very realistic and compelling plot that is completely situated in their social world.

Taken together, these results suggest that there might be an association between absorption in the novel, and (low points in) the average number of desired hyperlinks per page. This hypothesis will be further investigated in a case study of the problem novel *#Selfie* that will subsequently be discussed in the second part of the results section.

## **RQ2: What is the relationship between the placement of desired hyperlinks in a literary text and narrative absorption?**

The following table shows the average scores (on a scale of 1 to 5) that were attributed to each selected passage of the literary text, i.e. the problem novel, in terms of narrative absorption, operationalised as felt suspense, and their respective standard deviations. The respondents assigned each score only once, thus ordering the passages from 1 (least) to 5 (most compelling and suspenseful).

*Table 3. Caption here*

Table 3 shows that fragments C and D, with respective average absorption scores of 3.81 and 4.20 out of 5, are clearly perceived as the most suspenseful, followed by fragment E with an average absorption score of 2.73 out of 5. Fragments A and B, on the other hand, have very similar average absorption scores (2.18 out of 5), but are considered less suspenseful than the other fragments. A combination of the absorption scores (Table 3) with the average number of desired hyperlinks per page (Figure 5) results in Figure 7, with the suspenseful passages marked in yellow.

Interestingly, Figure 7 shows that the passages with the highest levels of felt suspense (fragments C and D), completely coincide with the lowest average hyperlink scores, and the hyperlink curve reaches an absolute low point (no marked hyperlinks) at the end of each of those passages, where felt suspense reaches its peak. Moreover, passages A and B show similar trends as the hyperlink curve drops while the story unwinds, only to reach an absolute low point precisely at the end of the passage. In between suspenseful fragments (pp. 121-128 and pp. 136-144), and most notably right after the most suspenseful passages (pp 163-180), the number of desired hyperlinks once again increases and peaks while the absorption decreases, and the story comes to an end.

*Figure 7. Caption here*

The separate data for explanatory and enriching hyperlinks, as shown in Figure 8, illustrate that the above applies for both hyperlink types. Both the desirability of explanatory and enriching hyperlinks diminishes near the end of suspenseful passages A, B and E, and reaches its lowest point during the most suspenseful passages C and D. This may be explained by the



fact that reading speed increases as the felt suspense augments, which leads to higher absorption levels, and less cognitive room for the annotation task (i.e. scanning for unknown concepts and/or beautiful passages). On the last ten pages of the novel, when the climax has been reached and absorption levels slowly decrease, reading speed diminishes and more cognitive space can be dedicated once again to detecting and marking desired hyperlinks.

*Figure 8. Caption here*

As the data shown in Figure 7 and 8 are based on the average scores for all readers of the problem novel, a combination of pupil and teacher perspectives, it might be hypothesised that the role of the respondent (teacher/pupil) could have an effect on the hyperlinks that both groups desire in the passages with the most elevated absorption levels. Consequently, to verify this claim, we zoom in on the hyperlink placement results for teachers and pupils separately in Figures 9 and 10, and match them with the suspenseful passages (marked in orange).

Figure 9a presents the combined (explanatory and enriching) hyperlink scores per page for the teachers during the most absorbing passages of the novel, while Figure 9b details those results for both hyperlink types separately.

*Figure 9a. Caption here*

*Figure 9b. Caption here*

Similarly, Figure 10a illustrates the combined hyperlinks scores per page for the pupil respondent group during the most absorbing passages of the novel, while Figure 10b presents the detailed results of explanatory and enriching hyperlinks separately.

*Figure 10a. Caption here*

*Figure 10b. Caption here*

Figures 9 and 10 show the average number of desired hyperlinks per page for respectively teachers and pupils. Surprisingly, the teacher hyperlink curve (Figure 9a) almost comes to a complete low point during passages C and D with the highest absorption levels (pp. 145-150;151-154), with a prolonged complete absence of desired hyperlinks. A similar trend, though less pronounced, can be observed on the last pages of suspenseful passages A (pp. 112-120), B (pp. 129-135), and E (pp. 155-163). Figure 9b shows that with regard to the teachers particularly the desirability of enriching hyperlinks almost completely disappears during the suspenseful passages, whereas the desirability of explanatory hyperlinks strongly diminishes.

The pupil hyperlink curve (Figure 10a), on the other hand, reaches its lowest points at the end of each suspenseful passage, and equally shows the lowest hyperlink scores during the most suspenseful passages, yet does not show any prolonged periods of complete hyperlink absence. Figure 10b shows that, in contrast to the teachers, pupil hyperlink desirability in the suspenseful passages comprises a combination of explanatory and enriching hyperlinks, and that there is no prolonged absence of neither of both hyperlink types.

This discrepancy in the results of both respondent groups could be attributed to differences in the levels of experienced narrative absorption. In that regard, Jacobs and Lüdtke (2017: 71)

argue that the absorption potential of a text can be predicted by its processing fluency profile and point out that:

Fluent effortless reading is supported by two basic processes: word recognition and eye movement control [...] and this highly automatized functioning is the result of years of training. Two main factors that make this possible on the side of readers are a rich and well-structured mental lexicon and an efficient eye movement control. On the text side, word familiarity and predictability are the main basic factors driving fluent reading. More complex factors are (descriptions of) familiar situations, plots etc. which also facilitate reading fluency and immersion [...].

As the language teachers in the study have had many more years of training in fluent effortless reading than their 7-8<sup>th</sup> grade pupils, and are subsequently expected to be familiar with more vocabulary, situations and plot development in narrative texts, a likely explanation is that their expert reading brains attain more elevated levels of narrative absorption, which has a more pronounced effect on the (lack of) desired hyperlinks over various pages.

Additionally, 7 of the 8 teachers who read the problem novel were female, as opposed to 16 of the 23 pupils, and women generally experience higher levels of narrative absorption than men (Van Laer et al., 2014). The comments of the teachers in the focus group discussions seem to support this notion. For instance, T53 commented: *“The novel reads smoothly. I finished it in just one or two evenings.”* T54 reported on this topic: *“I noticed that I marked less hyperlinks towards the end. At a certain point I even asked myself if I was not overlooking them by reading so quickly. I had become so absorbed by the story that as it (the plot) became clear to me, I probably subconsciously thought that it might be clear to them (the pupils) as well.”*

In other words, during the most suspenseful passages the teachers might become so absorbed in the story world that they read the novel from their own perspective, and thus no longer mark any hyperlinks, not even those they might otherwise consider useful for certain pupils. A partial explanation for the very limited number of enriching as opposed to explanatory hyperlinks may be that experienced readers evaluate literary value differently

than less experienced readers: teachers' literary knowledge might withhold them from marking stereotypical phrases and clichés in problem novels as enriching hyperlinks, as opposed to most pupils (Vanhees, Simons & Joosen, 2020). For instance, P008 marked "But my heart was still in my mouth (p. 157)", P088 selected "It felt like a weight off my mind (p. 163)", and P010 opted for "A shiver ran down my spine as I understood what he meant (p.170)"

At the same time, in the less suspenseful passages, the teachers are likely to experience lower absorption levels and may have less difficulty focusing on the annotation task, which shows in the hyperlink scores at some of the peaks in the teacher curve (Figure 9a), which are even more elevated than those of the pupils. A possible explanation is that, in the less suspenseful passages, the teachers adopt the perspectives of the differing pupils in their class, whereas the latter only mark hyperlinks they personally consider useful and/or interesting (Vanhees, Simons & Joosen, 2020). As T54 put it: "*You ask yourself if the pupils will understand. I specifically targeted our pupils of grade 7.*"

The pupils, on the other hand, might be less familiar with certain words, situations and plot development, which could lead to lower levels of narrative absorption during the suspenseful passages, and consequently explain the lack of prolonged low points in the pupil hyperlink desirability curve (Figure 10a). Moreover, some pupils might not only get less 'distracted' from the annotation task than their teachers, but might also run up against the limits of their knowledge more quickly, thus requiring more hyperlinks to support their reading, including during suspenseful passages, albeit they were not marked by their teachers, who adopted a more personal perspective during the absorbed reading of those passages. Interestingly, the average pupil scores showed that they remained attentive to style even as suspense increased in the problem novel, which shows in the quite similar numbers of enriching and explanatory hyperlinks they marked at those instances (Figure 10b).

## DISCUSSION AND CONCLUSION

Previous research has shown that the time spent on fictional reading is associated with improved reading comprehension, and can foster empathy in readers, as well as the ability to take on the perspectives of others. In the digital age, however, researchers and educators have become concerned about children's and adolescents' reading habits, as an increase in skimming of short, online texts, and a decrease in absorbed and/or deep reading of longer texts particularly seems to affect the willingness to read for pleasure of pupils in primary and secondary education. On the other hand, digital reading technologies might potentially also support fictional reading among adolescents, particularly with regard to those with reading difficulties and unmotivated readers. Particularly hypermedia fiction, digital narrative with a linear storyline enriched with supporting or enriching media materials, could have the potential to facilitate absorption in the narrative world even better than traditional print. To contribute to this ongoing discussion, the present study was designed to investigate the desirability of multimedia hyperlinks in adolescent fiction, with a specific focus on location, and the link with narrative absorption.

The first aim of the present research was to examine at what place in the story adolescent readers and their language teachers would mark hyperlinks they considered desirable in adolescent fiction. With respect to the first research question, it was found that for the five novels investigated, and independently of the novel genre, the largest portion of desired hyperlinks was concentrated in the first quartile of the story. This might be partially due to the novelty effect, which implies the enthusiasm of the respondents with regard to the annotation task diminishes as the story unfolds, and partially to the fact that many unknown words and

concepts are first introduced and thus marked in the first quartile of the story, yet no longer signalled if repeated later on in the novel.

However, the results also showed that the average number of desired hyperlinks per page for all novels had diminished by half in the fourth, as opposed to the first quartile of the story, and that with regard to all but one novel the number of desired hyperlinks gradually diminished from quartile one to four. Consequently, an alternative explanation could reside in the suspense structure of the story itself, and in the degree of narrative absorption the reader experienced, which gave rise to the assumption that as the story unfolds, and suspense increases, the reader might become more and more absorbed by the story world, so that hyperlinks to support his reading are less required. We thus hypothesised that the low points (where no or very few hyperlinks were desired) in the hyperlink desirability curves, as observed in a visualization of the data, might be related to suspenseful parts of the story, with elevated levels of narrative absorption on behalf of the reader. To further investigate this claim, we subsequently zoomed in on the genre most associated with suspense and absorbed reading practices, and with the lowest average desired hyperlink rate, namely the problem novel.

The second aim of this study was to investigate the relationship between desired hyperlinks and narrative absorption in a case study. With respect to the second research question, the results showed that the passages with the highest reported absorption levels completely coincided with the pages on which the lowest average hyperlink scores were marked in the problem novel. Moreover, the hyperlink curve reached its absolute low points (where no hyperlinks were desirable) precisely at the end of each of those suspenseful passages, where narrative absorption should be most elevated.

Closer scrutiny of the desired hyperlink rates of teachers and pupils separately revealed that both hyperlink curves showed low points at the end of absorbing passages, yet only the

teacher curve also showed prolonged periods of hyperlink absence, which became longer as the passages were considered more suspenseful. This result may be explained by the fact that language teachers possibly experience more elevated and long-lasting levels of narrative absorption than pupils. During highly absorbed reading the teachers might then adopt a more personal perspective, thus marking exclusively hyperlinks they would personally consider useful, as opposed to other parts of the story where they marked from the perspective of their pupils. The pupils, at their turn, might experience lower levels of narrative absorption and consequently less distraction from the annotation task. Additionally, certain pupils might also run up against the limits of their knowledge more quickly, and therefore still require to some extent hyperlinks to support their reading, even during more suspenseful passages.

Interestingly, in the case study, the average pupil scores showed that they remained not only attentive to materials to support their reading (explanatory hyperlinks) during the most absorbing passages, but also to literary style (enriching hyperlinks), and continued to mark both hyperlink types.

In summary, the findings of this study as a whole suggest that hyperlinks in digital narrative could be particularly useful for readers in the first quartile of the story, to support reading experiences and facilitate narrative absorption as the story unfolds. Yet, as the felt suspense increases and the story plot reaches its climax, for experienced readers, who can more easily attain more profound and prolonged levels of narrative absorption, hyperlinks may become less required, whereas novel and lower ability readers might still benefit from their support to sustain the reading experience. However, as this paper reports on a stimulation in which hypothetical hyperlinks were marked, these data must be interpreted with caution. To develop a full picture of the relationship between hyperlinks and absorption in narrative texts, additional reader-response studies will be needed in which the effects of real hyperlinks to supporting and enriching materials are measured.

The generalisability of these results is also subject to certain limitations. These findings cannot be simply extrapolated to all novels of the literary genres included in the study, as novels from the same genre might differ greatly (e.g., topic, length, style), which will equally determine the location of desired hyperlinks. Moreover, story-receiver variables (e.g. preference for a reading medium and/or technology) could also significantly influence narrative absorption, and might therefore indirectly determine hyperlink desirability. Finally, the link between hyperlink placement and narrative absorption has only been further investigated for one literary genre. It would be beneficial to verify whether the results still hold true for novels pertaining to the other genres in the study, and if narrative absorption is operationalized with more elaborate quantitative methods.

In spite of its limitations, the study certainly contributes to our understanding of the complex relationship between hyperlinks and the reading process of digital narrative in general, and the link with narrative absorption in particular. Further experiments, using a broader range of quantitative and qualitative techniques, and including a broad spectrum of story-receiver characteristics, could shed more light on the impact of hyperlinks on distinct aspects of narrative reading experiences, such as reading comprehension and narrative absorption, with a particular focus on the differences between highly proficient, experienced readers on the one hand, and novel and lower ability readers on the other. The results of this study can equally provide helpful insights for further research in which digital reading materials enriched with hyperlinks are developed and/or evaluated on distinct portable reading devices in terms of effects and suitability for different types of readers, as compared to e-books without hyperlinks and printed materials.

Finally, these findings can provide valuable insights for language teachers and teacher educators in the development of (teacher training) reading activities, and stimulate the use of



both digital and analogue reading technologies in the classroom, in order to facilitate absorbed reading practices and the development of deep reading skills in the digital age.

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